JAPANESE PATENT OFFICE
PATENT JOURNAL (A)
KOKAI PATENT APPLICATION NO. HEI 2[1990]-166798

Int. Cl.[5]:	H 05 K 7/20
Sequence No. for Office Use:	7373-5E
Filing No.:	Sho 63[1988]-322343
Filing Date:	December 21, 1988
Publication Date:	June 27, 1990
No. of Claims:	1 (Total of 4 pages)
Examination Request:	Not filed

HEAT DISSIPATING STRUCTURE OF A CASE FOR COMMUNICATION EQUIPMENT

Inventor: Hirohisa Ozawa
NEC Corp.
5-33-1 Shiba, Minato-ku, Tokyo

Yoshio Minowa
NEC Corp.
5-33-1 Shiba, Minato-ku, Tokyo

Applicant: NEC Corp.
5-33-1 Shiba, Minato-ku, Tokyo

Agent: Akio Suzuki, patent attorney

[There are no amendments to this patent.]

Claim

A heat dissipating structure of a case of communication equipment characterized by the following facts: it has a cylindrical case with heat dissipating fins on its peripheral surface, and a main plate that has heat generating members on it and can be inserted into the aforementioned case; on one side of the inner surface of the aforementioned case, there are a pair of ribs that form a groove for inserting one end portion of the aforementioned main plate into one side of the

inner surface, and, at the same time, on the surface of the opposite side, there are holes for inserting bolts into threaded holes formed on the other end portion of the aforementioned main plate; on one end portion of the aforementioned main plate, a leaf spring is mounted; the leaf spring can be inserted into the aforementioned groove and, when it is in elastic contact with the rib on one side, it causes one end portion of the main plate to contact the rib on the other side due to the reactive force.

Detailed explanation of the invention

Industrial application field

This invention pertains to the structure of a case of communication equipment. In particular, this invention pertains to a heat dissipating structure for dissipating heat generated inside the case to the outside.

Prior art

For communication equipment, it is required that heat generated inside it be dissipated at a high efficiency to the outside. Figure 4 is a diagram illustrating a conventional heat dissipating structure of this type. In this case, on the two ends of main plate (21) that have various electronic parts as heat generating members (22) attached to it, case walls (23) having plural heat dissipating fins (24) on the outside are formed integrally. Then, lid (25) having plural heat dissipating fins (26) formed on it from the upper end portion through the lower end portion of two case walls (23) is fixed by means of screws, etc.

In this case, in order to improve the heat transfer from main plate (21) to case walls (23), case walls (23) and main plate (21) are formed integrally by means of machine processing.

Problems to be solved by the invention

In the aforementioned conventional heat dissipating structure, because main plate (21) is recessed with respect to case walls (23) on the two sides, it is believed that these parts may be formed using casting method. However, a high dimensional precision is required because main plate (21) carries heat generating members. The required precision cannot be met using the present casting method, so machine processing has to be performed. Also, even when machine processing, special tools with long blades are needed in order to form the recessed shape. Use of these tools leads to poor efficiency and low productivity, and is a major obstacle to mass production.

Also, it is difficult to install members or to perform wire soldering because main plate (21) is recessed. Such operation requires skilled workers, and this is undesirable.

The purpose of this invention is to provide a type of heat dissipating structure that is easy to assemble and mass produce.

Means to solve the problems

The heat dissipating structure of this invention is composed of a cylindrical case with heat dissipating fins on its peripheral surface and a main plate that has heat generating members on it and can be inserted into the aforementioned case. On one side of the inner surface of the aforementioned case, there are a pair of ribs that form a groove for inserting one end portion of the aforementioned main plate into one side of the inner surface. At the same time, on the surface of the opposite side, there are holes for inserting bolts into threaded holes formed on the other end portion of the aforementioned main plate. On one end portion of the aforementioned main plate, a leaf spring is mounted. The leaf spring can be inserted into the aforementioned groove, when it is in elastic contact with the rib on one side, it causes one end portion of the main plate to contact the rib on the other side due to the reactive force.

Functions

In the aforementioned constitution, a heat dissipating structure can be assembled by simply inserting the main plate into the case and fastening it with a bolt. In this case, one end portion of the main plate is brought into contact with the case due to the elastic force of the leaf spring set on the main plate, so that heat can be transferred from the main plate to the case, and that the heat dispersed throughout the case and main plate can be absorbed.

Application examples

In the following, this invention will be explained with reference to the figures.

Figure 1 is a cross-sectional view illustrating an application example of this invention. Figure 2 is a partial exploded view. In these figures, case (1) is made of a cylindrical member having plural heat dissipating fins (2) formed integrally on its outer side. Also, main plate (3) has a structure that allows electronic members as heat generating members (4) to be attached to it.

On one side of the inner surface of said case (1), groove (7) is formed from a pair of ribs (5) and (6). One side of said main plate (3) can be inserted into said groove (7). Also, on the opposite side of the inner surface of case (1), plural holes (8) are formed in the radial direction and are side by side in the axial direction. These holes allow insertion of bolts (9) from the outer side.

Main plate (3) is formed with a width a little smaller than the inner diameter of case (1). On one end portion of the main plate, leaf spring (10) facing upward has one end supported.

Also, on the opposite side of main plate (3), threaded holes (11) are formed for inserting of said bolts (9).

Also, (12) represents a lid that covers each of the two end openings of case (1).

In this constitution, main plate (3) that carries heat generating members (4) is installed in case (1). First of all, as shown in Figure 3(a), one side of main plate (3) is inserted from one end opening of case (1) along groove (7). In this case, a gap is generated between leaf spring (10) and the inner surface of main plate (3) and groove (7) so that main plate (3) can be inserted into case (1) easily.

As shown in Figure 3(b), when main plate (3) is inserted to the desired position inside case (1), bolts (9) are inserted through holes (8) from outside case (1), and the bolts are inserted into threaded holes (11) on main plate (3), respectively. Then, as bolts (9) are fastened, main plate (3) moves to the right, and, correspondingly, the tip of leaf spring (10) hits the slope portion of rib (5) and is pressed downward. Due to the reactive force generated by this deformation, main plate (3) is pressed on rib (6) and makes thermal contact. Also, on the other end of main plate (3), thermal contact is made with case (1) by means of bolts (9).

In this state of the aforementioned constitution, heat generated by heat generating members (4) is transferred to case (1) through rib (6) that is in contact with one side of the plate by means of the elastic force of leaf spring (10), and the heat is dissipated to the outside. Also, on the other side of the plate, heat is transferred through bolts (9) to case (1) and is dissipated to the outside of the case.

Consequently, in this constitution, it is required that main plate (3) be manufactured at a high precision. On the other hand, case (1) can be manufactured using the aluminum extrusion method because case (1) is not required to have a high precision. Also, the main plate can be manufactured using the die cast method. It is possible to reduce the member manufacturing cost significantly because manufacturing becomes easier. Also, mounting of main plate (3) on case (1) can be performed by simply fastening bolts (9), and it is still possible to ensure a preferable thermal conductive structure by means of leaf spring (10) formed on the plate even head is dispersed between main plate (3) and case (1). As a result, assembly can be performed easily.

Effects of the invention

As explained above, according to this invention, a heat dissipating structure can be assembled by inserting a main plate having heat generating members on it into a cylindrical case and by fastening bolts. Consequently, assembly and other operations can be performed easily. Also, due to the elastic force of the leaf spring, one end portion of the main plate comes in contact with the case, and heat can be transferred from the main plate to the case. Consequently, preferable contact between the rib and main plate can be maintained at all times, and excellent

heat dissipating ability can be displayed even when heat is dispersed in the inner diameter of the case and the main plate.

Brief description of figures

Figure 1 is a cross-sectional view illustrating an application example of this invention. Figure 2 is a partial exploded view. Figures 3(a) and (b) are cross-sectional views illustrating the assembly operation. Figure 4 is a cross-sectional view of the conventional structure.

1	Case
2	Heat dissipating fin
3	Main plate
4	Heat generating member
5, 6	Rib
7	Groove
8	Hole
9	Bolt
10	Leaf spring
11	Threaded hole
12	Lid
21	Main plate
22	Heat generating member
23	Case wall
24	Heat dissipating fin
25	Lid
26	Heat dissipating fin

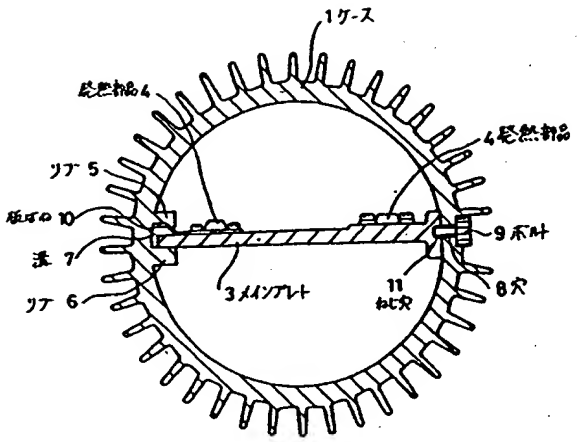

Figure 1

Key:
	1	Case
	3	Main plate
	4	Heat generating member
	5, 6	Rib
	7	Groove
	8	Hole
	9	Bolt
	10	Leaf spring
	11	Threaded hole

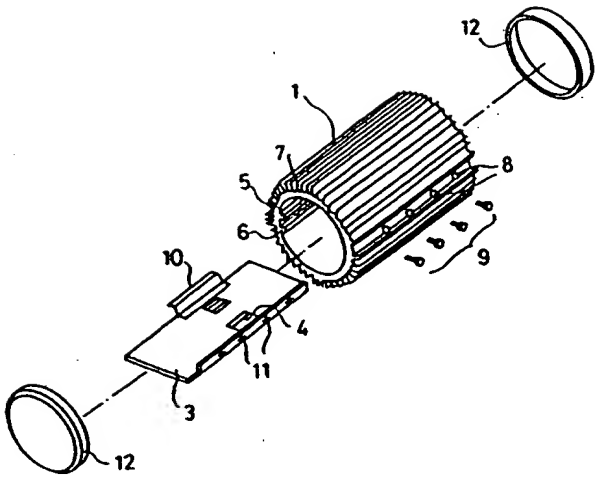

Figure 2

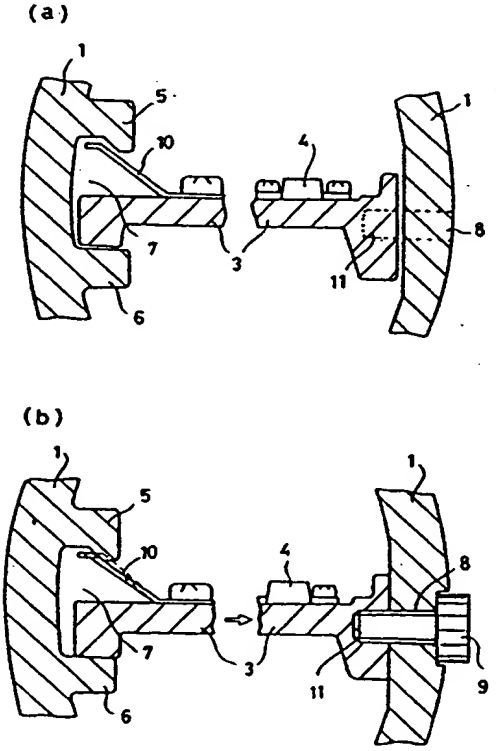

Figure 3

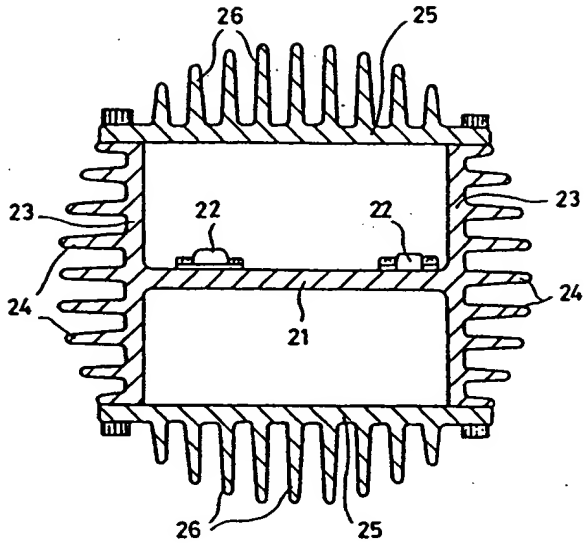

Figure 4